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ABSTRACT

Giving names for pictures of familiar objects to nursery school children improves their later recognition of those pictures. This improvement occurs even though the children can easily name the pictures when asked. The present research eliminated the sufficiency of several possible explanations. The names might have provided a response to rehearse and consequently use to differentiate the recognition alternatives. But this explanation is insufficient since names help even for recognition tests containing distractors with the same names as the correct pictures. Names might have helped by providing specific retrieval cues. The child could then use this general knowledge in analyzing and storing specific characteristics. This explanation is insufficient since grossly incongruous descriptions help recognition as do appropriate labels or descriptions. It seems that under these conditions any description which is itself meaningful stimulates a young child to more actively analyze and store accompanying pictures. The extreme non-specificity of this effect suggests caution in attributing labeling effects to specific characteristics associated with the label. (Author/RG)

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The Contribution of Verbal Descriptions to Visual Memory in Nursery-School Children

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Preface

I would like to express appreciation for the help received on this project. Mrs. Hope Evenden was a most capable and conscientious research assistant throughout the term of the research. Dr. Richard Rosinski, of the University of Pittsburgh most generously provided the details of his thesis experiments and allowed the use of dhe drawings he had used as stimuli. The Hamilton Cooperative Nursery School Council was helpful in allowing the use of their facilities and pupils throughout the Hamilton area.

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Introduction

When a pre- or early-school-age child is asked to remember a series of familiar objects, his retention is improved by either naming the objects for him or by asking him to name them. The fact that he can profit from being told to provide labels indicates that he is not suffering from an inability to use words. Rather, one suspects that he has simply not acquired the strategy of producing words in situations in which they would be mnemonically useful. This distinction between a deficiency in spontaneously producing words and a deficiency in using them once they have been produced is the basis of the very informative work by Flavell and his associates (Flavell, 1970, is a review of this entire literature. The individual references are given at the end of this report). In their recent papers, they have extended the distinction between spontaneous production and functional ability to a much wider variety of mnemonic activities than naming. For example, under some circumstances pointing, drawing, or repeated inspection could serve the mnemonic function of keeping the presentation event alive. All of these activities have a later age of onset for spontaneous production than onset of ability to profit from them once produced.

The fact that the rehearsal function of words has been well documented by Flavell, however, should not be taken as a demonstration that rehearsal is the only mnemonic consequence of providing labels for the child. The fact that a familiar label makes an easily-rehearsible response does not preclude words having other mnemonic functions. The possible mnemonic functions of labels that first come to mind depend upon the explicit execution of the verbal response at some stage of processing. For example, in addition to the possibility of the child rehearsing the labels, he might free recall them prior to visual recognition of the presentation events, or label the recognition pictures and then recognize that label. However, a quite different class of equally plausible functions is that the word triggers a different way of processing the visual information. An analogy would be to ask how an instruction that was given to a computer influenced the storage and output. The instruction could call for a routine that changed the input information into a more efficient form for storage and output. But, one would not attempt to explain the characteristics of the output from the properties of the instruction intself, and one would not necessarily expect to find the instruction itself stored with or acting as a call for the transformed input. To extend this analogy to words, a label might suggest salient details to search for and store in the picture, or might provide a well-learned retrieval scheme to guide a memory search for details.

Evidence which selected among these possibilities was provided by Wilgosh, in a dissertation carried out under my direction. Nursery-school children were given a recognition memory test which included incorrect pictures that would normally be labeled by the same names as were the pictures the child was supposed to recognize. For instance, if

the presentation items were dog, cat, horse, cow, sheep, and goat, then the recognition items consisted of the original picture of the dog and a picture of a visually dissimilar dog, the original cat picture and an additional cat picture, and so on. Despite this, adding the simple labels (dog, cat, etc.) to the original visual presentation markedly improved the child's ability to recognize the picture that he had originally seen during presentation. This result is certainly not expected on the basis of any of the explanations listed above. Since the labels were non-differential for recognition, the subject should not have benefitted from rehearsing them, from having recalled them during recognition, or from having produced and recognized labels for the recognition pictures. In fact, this result eliminates the sufficiency of any explanation that relies on the properties or the common associations of the label itself. Since the label has a facilitative effect but is not acting independently, then it seems probable that it is changing the way in which the visual information is processed.

A further relevant piece of information was provided by the fact that the facilitative effect of the verbal presentation was not limited to the short, familiar labels. For some groups, the verbal presentation consisted of familiar labels; for other groups, it consisted of short, descriptive phrases which the children could easily match with the pictures. These descriptive phrases were selected to be a good deal less rehearsable and verbally familiar than the labels. If the child, who is presumed to be suffering from production deficiency, did not transform the phrases into labels, then a function such as rehearsal or possibly recall would be less effectively served. In fact, however, decreased effectiveness was found only for verbal recall; visual recognition was facilitated every bit as much as by the familiar labels. Conceivably this difference in effect on the two tests of memory could be due to the child converting each description into a label, which would be helpful for recognition, but difficult to reconvert for verbal recall. However, when the children were allowed or even required to recall labels after a verbal or visual-verbal presentation that used descriptions, recall was still poorer than if they had been presented labels in the first place. In addition, recognition was also equally facilitated by descriptions and by labels for the children who had not previously been shown the pictures; in a later test, these children were unable to produce relevant labels from many of the descriptions alone, even when asked to do them one at a time. From these results we concluded that the equally facilitative effect of descriptive phrases was not solely due to the child converting them to labels. Once again, this suggests that the effect of the verbal presentation for recognition performance is not dependent upon the properties of the words themselves. Instead, a more likely alternative is that the verbal presentation is influencing the manner in which unique details of the visual information are stored or retrieved.

Distinguishing alternatives such as these provide some basic information on the coordination of visual and verbal information in the child. Obviously when the child was a toddler he must have had some non-verbal means of storing information about the visual world. But as his verbal abilities expanded he acquired a new way of coding this information. Familiar visual concepts, such as those used in the present studies, are the type of material

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for which the coordination between the new and the old abilities must be accomplished. Does the new verbal code act as a set of distinctive and rehearsable responses, as an index for newly-acquired general information about the familiar visual categories, or as the call for a method of analyzing and storing the unique details of a particular instance of the visual categories?

As a step toward answering these questions, the present project was designed to discover what range of verbal material would produce the facilitative effect. It is quite possible that whatever function the label is playing could be served by a variety of verbal stimuli. This is true even if the function of the label is solely to make available information about the object; that is, there is no reason to believe that an explicitly-executed label is the only index to information about a concept. One step has already been taken toward finding equivalent verbal stimuli by presenting the descriptive phrases in the experiment described above. In this case, all of the phrases were clearly connoted by the particular object that was depicted. It would be interesting to discover if the same facilitation or recognition would occur if one presented phrases that described something true about the picture but which was not connoted by the object depicted. For example, "Sally and Tommy went to the zoo, and they saw an animal that was eating, an animal that was looking at them, an animal that was asleep, etc." Or, one could ask about the possibility that <u>any</u> verbalization concurrent with a picture would result in better recognition. In this case "Sally and Tommy went to the zoo and talked and saw some animals; they saw this animal and Tommy said 'this is good popcorn'; they saw this animal and Sally said 'Mommy, can I have a balloon?', etc.".

If some of these types of verbal accomplishments aid recognition and others do not, then one would have a tool for analyzing the storage and retrieval processes of the child. For example, one possibility is that the only kind of information in a picture that would be facilitated is information that is uniquely associated with the object being labeled. For example, when one hears the word "pig" one knows that an animal is being referred to that characteristically could be rooting, oinking, wallowing in mud, and so on When a picture is then presented that shows the pig wallowing, one already has some preparation for storing that information, and having that information would help to select "pig" rather than some other animal during retrieval. In contrast, discovering that the animal was standing would not have been specifically prepared for by the word "pig" and retrieving this piece of information would not be of much help in selecting the word "pig".

This explanation could be loosened slightly and become more plausible. By this notion, <u>whatever</u> pose or markings that the object had would be facilitated, if they could be described with reference to the normal range of variation of the animal. Walking, standing, or chewing cud, a cow is still a cow; knowing something about cows helps no matter what she is doing. Unless of course, the cow was carrying an umbrella, or wearing a pair of galoshes, or standing next to a house. In this case, one's normal knowledge about a cow might not be of much value. In other words, the facilitative value of a label might be restricted to characteristics of the object being labeled, and not extend to independent, separately-namable objects.

The preceding examples illustrate the major aims of the present study. In more general terms, our intent was to use the verbal facilitation effect to study the way in which specific information is stored in a recognition task. To do this two different lines of work were carried out. In one of these the pictures used in the recognition test were varied to examine how specific or how general the coding was that resulted from presenting a label. Work on this portion of the project is reported in the succeeding section, entitled "Variations in the Pictures". In general this work was not successful and is consequently reported very briefly. Approximately one third of the project time was spent in this unsuccessful effort to discover the conditions which would allow an adequate test of the effect of specific variations in the recognition pictures.

The second line of work varied the verbal description which accompanied the pictures. This work is reported in the succeeding section entitled "Variations in the verbal description". The results of this work showed that the facilitative effect of verbal descriptions is amazingly non-specific. The same degree of facilitation was found from labels and from verbal descriptions that flatly contradicted information visible in the accompanying picture. A discussion of the implications of this finding is in the Conclusions section.

Variations in the Pictures

Sets of recognition alternatives were drawn which contained instances of varying degrees of departure from the original picture. It was hoped that this would allow us to assess what types of information were encoded by various verbal descriptions. For example, for each of 20 pictures a recognition set of four cards was constructed which included (i) the original (ii) the original animal or object but in a different location or posture from the original (iii) a different animal or object but in the same posture or location as the original (iv) both object and posture different. With this kind of material we could assess, among other things, whether a description of location or activity would automatically facilitate the identity of the individual engaging in that activity, but not vice versa.

However, to use these pictures for this purpose, the children would have to be able to perform above chance in recognizing the correct alternative, but still make enough errors to differentiate the various incorrect alternatives. In a series of short pilot experiments it became evident that the children could not perform above chance when presented with the full set of four pictures. On the other hand, when the task was reduced in some fashion which would allow above chance performance the size of the verbal facilitation effect declined to a level that it was impractical to use as an index of mnemonic coding. Four experiments in this series are reported briefly below to illustrate the problem and the general results obtained. The main variation in these experiments was in the direction of progressive simplification of the stimulus material.

Method

Subjects. The children were contacted in various pre-schools in the Hamilton area. A deliberate effort was made to keep the sample in each experiment representative in age with the overall population we could draw upon. The average age of each of the samples in these experiments was within two months of 4 years, 5 months, with a range from 3 years, 1 month, to six years, one month. None of the children had had any prior experience with the experimental situation.

Material. Experiment 1: There were two test sets of 12 presentation pictures (PP) and 8 distractor pictures (DP) each. The three instruction sets had 2 PPs and 2 DPs apiece. One scene was common to all pictures in any set while the objects in the PPs differed. Half the DPs were of the same individual object in a different position within the scene, or posture, or condition (i.e., broken table vs. unbroken), or orientation from the corresponding PP, while the remainder of the DPs were of a different individual object with the same generic name as the corresponding PP object in the same position etc. as the PP. Examples are included in the appendix.

Experiment 2: The objects from Experiment 1 were placed in a position on a 5" x 8" white card that matched exactly the position it occupied on the 5" x 8" scene in Experiment 1. It was hoped that removing the meaningful context of the pictures would increase dependence on a verbal or verbally-initiated process.

Experiment 3: The cards were the objects on the plain white cards as were used in Exp. #2. The composition of the sets, however, differed from Experiments 1 and 2. The two scrambled test sets, nos. (i) and (ii) were each made up to three items apiece from the previous two test sets, plus two items from the previous instruction sets. This had the effect of mixing zoo items, grocery items and farm items all together. As in the change introduced in experiment 2 it was hoped that breaking up the strong context would make the child rely more on a type of retrieval or interpretive process that would be stimulated by the label.

Experiment 4: Entirely new stimuli were drawn for Experiment 4. In this case care was taken to have each one drawn in a different style. This was intended to test the notion that variations in style might provide more differentiable features to be stored in any verbal interaction. This hypothesis was not regarded as being of high probability, but it was one last effort to get a set of stimuli that would produce a sufficiently large effect to be the basis of further experimentation.

Procedure. Each test was presented as a "story" about what Sally and Tommy saw when they went to the (e.g.) zoo. There were two presentation conditions; visual, the E said "this" upon presenting each PP, and visual-verbal, the E said the object's name upon presenting each PP. Subjects were tested on both conditions in the same session. Pretest instruction consisted of 2 or 3 sets of 2 PPs each, and was conducted with correction under both presentation conditions just prior to the actual testing. The S was required to get at least one set with both items correct before proceeding to the tests. Correction was in the form of going over the error, and repeating presentation of that set, or pointing out what difference there was between the PP and DP to the S and then repeating the procedure presentation of that particular set.

During recognition, if the S persisted in placing a finger on both cards the E would then ask him to "hand me the one you saw before the story". In order to retain or regain the S's attention at any time, the E would ask "are you ready".

The Ss were presented with 12 PPs placed face-up on the table one on top of another at the rate of one picture every two seconds (approximately). The E said "this" or the object's label as the card was presented. Ss were not required to point to the card, but did repeat the label of the object in the visual-verbal condition.

Subjects were tested on 8 of the PP items in a binary forced choice procedure, upon completion of which the S was asked to recall as many items as he could. On the visual condition the S was asked to identify the PPs he was tested on and all the DPs. Labels other than those used for the same set in the V-V condition were accepted.

The experiment was counterbalanced initially for presentation condition to be run first as well as presentation condition per set. Presentation and recognition orders were random with the following restrictions: (i) to avoid primacy and recency effects, 2 dummy pictures were presented at the beginning and the other 2 dummy pictures at the end of each presentation; (ii) PPs with a corresponding DP consisting of the same individual (Card nos. 1 to 4) alternated with PPs whose corresponding DP was a different individual (Card Nos. 5 to 8). (iii) further, if PP began with Nos. 1 to 4 during presentation, then recognition would begin with nos. 5 to 8. (iv) Each PP card in a set began a presentation series once and ended a series once insofar as the test items were involved; and (v) the first or last pictures during presentation were neither the first nor last pictures in the corresponding recognition series. Otherwise presentation and recognition orders varied independently.

Results and Discussion

Performance on both recall and recognition is shown in Table 1. It is clear that the overall results replicate the original finding made in Wilgosh's thesis. Both recognition and recall are better when a label is provided, even though the label itself does not differentiate the recognition alternatives. Since these were essentially pilot experiments only a small number of subjects were run in each experiment. Consequently, the only statistics calculated were for the overall result of the four experiments. On within-subjects tests the visual-label conditions showed significantly better recognition ($t=3.10$, $p<.01$) and recall ($t=2.84$, $p<.01$) than did the visual-only conditions.

These results are encouraging in that the same finding has been made despite a considerable difference in the recognition testing method. In Wilgosh's thesis experiments the child was given a large array containing all 6 of the original pictures and all 6 of the distractors. In the present experiments the recognition tests were given by presenting the child with a series of pairs of pictures. This method gives considerably greater flexibility in testing and was a necessary variation in order to allow progress on the main purpose of this project.

However, these results are considerably less encouraging for the use of different types of distractor pictures to ascertain differences in the mnemonic coding used by the child. To use the pictures for such a purpose- the presence or absence of labelling would have to <u>interact</u> with the type of errors that the child made. For example, if the coding induced by a label caused the child to remember the individual being labelled more than where it was or what it was doing, then we might expect a greater difference between the error-same and the error-different scores for the label condition than for the visual condition. However, as can be inferred from those scores in Table 1 the data were not sufficiently strong to allow either clear acceptance or rejection of such hypotheses. The total number of errors were small, there was large between-subject variation in the distribution of

Table 1.

Percent responses that are correct or are errors made to "same individual" or "different individual" in each of four experiments. The experiments differ only in the pictures that were shown. In each case there were 12 pictures per presentation.

	VISUAL				VISUAL-LABEL			
	recognition			recall correct	recognition			recall correct
	correct	error same	error different		correct	error same	error different	
Experiment 1 N = 8	76	14	8	38	85	11	4	62
Experiment 2 N = 8	81	13	6	50	86	6	8	51
Experiment 3 N = 8	86	10	4	35	90	5	5	38
Experiment 4 N = 14	71	18	11	19	76	13	11	31
Average	78	14	7	35	84	9	7	45

those errors across the conditions, and several of the scores were involved in ties. It is possible that one could find the conditions that would allow more adequate assessment of this issue, but since our attempts in this direction were so unencouraging, I decided to concentrate on a different question that arose from the labelling effect.

Variations in the Verbal Component

In order to understand the facilitation accomplished by a verbal label it is necessary to discover what range of verbal stimuli will produce the same effect. If a common label were the only verbal token which produced facilitation, one would be inclined to have a very different theory than if any meaningful utterance were equally effective. The experiments described in this section were designed to test the effects of different types of verbal components.

As was mentioned in the introduction, one step in this direction has already been taken. One type of verbal material used in Wilgosh's thesis experiments was descriptive phrases that were designed to describe an object in terms of characteristics normally connoted by the label. These connotation phrases, which were longer and presumably less rehearsable than the labels, resulted in worse recall but equally good recognition as that produced by the labels. Since the recall was worse with the phrases, the equivalent effect on recognition cannot be dismissed as a case of the child immediately translating the phrase into a label and then proceeding from there. However, it is still true that the phrase is closely related to the same general category that the label is naming. Possible this relation to a general scheme of knowledge that the child has acquired is the critical feature which produces the verbal facilitation that we have been finding.

To test this we presented non-connotative phrases, phrases that described something that was true about the picture being shown but which was not normally connoted by the generic category to which the object being shown belonged. An example is using the phrase "is looking at you" to describe a picture of an owl that is shown as looking at the viewer. If the crucial contribution of the verbal component of presentation is to improve the access the child has to his generic information about the object being shown, then these phases should be a good deal less effective.

As will be described below, the non-connotative phrases in fact have as large a facilitating effect on recognition as do the labels. To test the limits of verbal facilitation one step further, incongruous phrases were used. These phrases make a statement which is clearly not true of the picture being shown and which, in some cases, could not be true of the object being shown under any real circumstances. The final two verbal manipulations, which will be motivated below, were in one experiment to present nonsense syllables and in another experiment the same two incongruous phrases with each of the pictures.

Method

Subjects. The subjects in these experiments were drawn from the same general pool as were the subjects in the previous experiment. Again, the ages were controlled to cause the mean of each group to fall within two months of 4 years, 5 months. In these experiments the range of ages was from 3 years, 9 months, to 5 years, 5 months.

Material. The pictures in all experiments were simple outline drawings (samples of which are in appendix C) that were kindly supplied to us by Dr. Richard Rosinski of the University of Pittsburgh. In his Ph.D. thesis Dr. Rosinski had followed up on Wilgosh's original finding and reported larger differences than we were currently getting with a similar method. The pictures consisted of two lists of 32 pairs of drawings. Each pair of drawings showed two members of the same generic category; one member was randomly selected for each subject to be the presentation picture, and the other was paired with the presentation picture to provide a distractor during recognition testing.

The labels non-connotative and incongruous phrases for each of the pictures are shown in appendix D. For the same phrase condition, each of the two incongruous phrases "it is hungry" and "it is saying hello" were randomly assigned to half of the stimuli within a list. For the nonsense syllable condition, a separate easily pronounceable syllable was paired with each of the pictures in a list.

Procedure. The procedure was identical to that used in the previous experiments with the following exceptions. The presentation and testing lists consisted of 32 rather than the 12 present and 8 test items used in experiments 1 through 4. Experiments 6 through 11 were run without use of the "story" context previously used. Instead the subjects were told that they would be shown a set of pictures and that they were to remember what they had seen and (where appropriate) heard. This story did not appear to be having any effect in the previous experiment and was less plausible with the diverse stimuli used in the current experiments. It was thus dropped in interests of simplicity. In experiments 6 through 11 the subjects were not asked to repeat the verbal component immediately after the experimenter had said it. This procedure had been used in experiments 1 - 5, but resulted in unnecessary ambiguity about the locus of the verbal facilitation effect. It is possible that the effect was due solely to the vocal response requirement which of course was not there for the visual conditions. Experiment 5, then, was run with 2 procedures that were closer to that used in the preceding sections than to that used in the remainder of the experiments in this section. However, it is being included in this section since the purpose and stimuli were the same as in the current section, and, as will be shown, the results were not noticeably different.

All comparisons reported in this section are within subjects. The training (instructional) procedure and the first list were run on one day and a repeat of the instructions and a second list were run on the second (consecutive wherever possible) day. Order of conditions and list assigned to condition were counterbalanced in all experiments.

Results and Discussion

Percent correct recognition for experiments 5 - 11 is presented in Tables 2 and 4. This data will be described experiment-by-experiment in the succeeding paragraphs. The largely uninformative item and order analyses on the recognition data and the recall data itself will be mentioned at the end of this section.

Experiment 5. Each subject was run in counterbalanced order on one list for which labels were given and one list for which they were not. As in the previous section, the visual-label group did significantly better on recognition than did the visual-only group ($t=3.21$). This establishes the finding for this set of pictures and length of list. The effect is strong, but does not seem to be a different order of magnitude than the previous experiments. In subsequent private communication, Dr. Rosinski has also indicated that his initially very strong finding has declined somewhat in size during attempted replication.

Experiment 6. In this experiment the subjects were given non-connotational phrases instead of labels. The effect ($t=2.73$) and the literal numbers seem to be remarkably similar to that obtained with labels. Evidently, referring to the generic category to which the depicted object belongs does not seem to be crucial. Again, this finding is obtained despite the fact that the non-connotative phrases belong equally well with both members of the pair of pictures presented for recognition.

Experiment 7. The labels and non-connotative phrases were run on separate lists within the subjects of a single experiment. If we wish to conclude that there is no detectable difference between the effects of labels and those of non-connotative phrases, a much stronger case is obviously provided by a within-subjects comparison. In fact, there was no tendency towards a difference between the two types of verbal components ($t=.48$), a finding which cannot be attributed to the lack of sensitivity of a between-subjects experiment.

Experiment 8. We had a very strong expectation that the verbal component had to be meaningfully related to the pictures for there to be a facilitative effect. The present experiment, in which incongruous descriptions were used, was originally intended to provide a case in which the verbal component was ineffective. However, approximately the same effect was obtained with these phrases ($t=.39$). One could claim that the experience that these children have had with make-believe in stories and on television allowed them to relate any meaningful phrase to any picture. It is certainly true that the children did not appear to be puzzled by the incongruity of the phrases, but instead accepted them quite calmly. However, the least that can be said is that the virtual identity between the effect of these phrases and those of the obvious labels was a surprise to the present experimenters.

Table 2.

Percent correct recognition in six within-subjects between-lists experiments. P refers to overall test between major conditions. The same pictures, 32 per presentation, were used in all experiments. N = 20 for all experiments.

Experiment	VISUAL			VISUAL-VERBAL						p
				Labels			Phrases			
	1st	2nd	both	1st	2nd	both	1st	2nd	both	
5 visual & labels	.64	.71	.68	.80	.76	.78				<.01
6 visual & noncon. phrases	.65	.70	.68				.73	.80	.77	<.05
7 labels & noncon. phrases				.70	.78	.74	.73	.72	.73	-
8 labels & incong. phrases				.74	.75	.74	.68	.77	.73	-
9 labels & same phrases				.70	.83	.77	.72	.68	.70	<.05
10 labels & nonsense words				.72	.80	.76	.63	.70	.67	<.05

Table 3.

Percent correct recall for six within-subjects between lists experiments.

Experiment	VISUAL	VISUAL-VERBAL	
		Labels	Phrases
5	11	15	-
6	9	-	11
7		13	10
8		13	9
9		13	10
10		14	12

Table 4

Percent correct recognition in an experiment in which the verbal accompaniment was varied within lists. Each of 20 subjects performed on one list in which half of the pictures were described by incongruous phrases and half were not and on another list in which half the items were labelled and half were described with incongruous phrases. Order of lists was balanced between subjects.

Order of this list	Visual only	Incongruous Phrases		labels	phrases
1	.64	.77		.75	.78
2	.71	.80		.71	.73
	.67	.79	$p < .01$	.73	.75

Experiment 9. The preceding results raise the question of whether combining any two verbal operations within the same experiment would tend to induce a comparable effect from both of them. The plausibility of this is decreased by the fact that there are few signs of such induction between the visual-only and the labels conditions. However, since induction could be controlled by the presence of a verbal component per se, it seemed important to obtain at least one condition in which two different verbal components did not produce the same effect. One of the aims of this and the following experiment was to obtain such a result. In the present experiment the same two incongruous phrases were associated with every item on one of the lists, and in fact, poorer recognition was obtained when this was done ($t=2.98$). If this result had not been obtained, we could have eliminated the need for any attribute other than an interaction between the phrase and the various pictures to provide sufficient differentiation to improve recognition. As it is, however, we cannot tell whether the identity of the phrases caused to children for some non-mnemonic reason to not attend to them or the identity to simply add a non-differential and thus ineffective element to the trace. What is clear is that the identity of the phrases did not result in greater confusion than that present with no verbal component in presentation.

Experiment 10. In this experiment different nonsense syllables were associated with each of the pictures in one of the lists. This resulted in significantly poorer performance than was obtained for labels ($t=2.84$). This suggests that the verbal accompaniments have to be meaningful in themselves to produce the facilitation effect. This certainly does not constitute a surprising finding, but in the context of the previous results it still seems worth establishing.

Experiment 11. Evidently a very wide variety of verbal stimuli can produce facilitation of recognition. This raises the question of whether what a meaningful phrase can do is simply induce a more active strategy on the part of the child. To increase the plausibility of such a notion, it would be important to show that the effect was not limited to one stimulus at a time. That is, under the normal interpretation of strategy, one would expect that the effect would be shown for all or most members of a single list, even if some of the items did not have verbal accompaniments. In the present experiment, half of the items in one list were unaccompanied and half were accompanied by different incongruous phrases. Despite the mixing within lists, a difference was obtained ($t=3.00$). In the other list, presented in counterbalanced order, labels and incongruous phrases were mixed. The similarity of effect was again confirmed ($t=.26$). These results, then, confirm the basic effects established in the previous analyses and decrease the plausibility of a strategy explanation

Other analyses. Several small trends were seen in order of effects, but none of them turned out to be significant or consistent across experiments. Extensive item analyses were done in the hope that variations in items would give some clue to the source of the facilitation effect. However, there were no special characteristics noted for those items aided most within a given experiment, and there was only marginal consistency of what items were aided most across experiments.

The recall data for experiments 5 - 10 are shown in Table 3. There was no variation on note across the various conditions. The general level of performance is down from that seen in the previous section, apparently due to the increased number of stimuli. As in Wilgosh's thesis experiments, the level of recall is close to that expected from the digit-span performance of children of this age, about 4 items. However, recall in this case is not ordered, and what is being recalled is the identity of the objects, not the particular phrase that was associated with it. The recall data does not seem to provide any additional information about the verbal facilitation of recognition.

General Discussion

In summary, a nursery school child's ability to recognize pictures of common objects is improved by accompanying the picture with any of a wide variety of meaningful verbal stimuli. Approximately equal facilitation of recognition is provided by familiar labels, by phrases that describe aspects of the picture not normally connoted by the label, and by phrases that are incongruous with the picture. This facilitation is not observed when the accompanying verbal component is the same for a large number of the pictures in a list, or when the verbal component is provided by a set of nonsense syllables.

These results clearly eliminate any explanation for the verbal facilitation effect which depend upon the mnemonic characteristics of the specific verbal stimulus. Such explanations include the possibility that the verbal component is easily rehearsed and therefore can keep the information in the stimulus presenation alive for a longer portion of the retention interval. Also excluded is any notion that the verbal component is either easily recalled directly or is at least independently recalled, thereby increasing the numb er of mnemonic targets during retrieval. The particular findings that exclude these notions include the fact that recall of generic categories accounted for a smaller proportion of the items when the presentation list length was increased to 32, but the proportional size of the effect on recognition if anything increased. In addition, as the length and unfamiliarity increased from labels to incongruous phrases there was no decrement in the size of the facilitation effect. These two variables could easily be expected to influence the extent to which the verbal component could be rehearsed or recalled. Finally, one might expect that the ease of association between an incongruous phrase and the details of the picture it accompanied would be less than between a familiar label and the corresponding picture; the picture at least connotes the appropriateness of the details that the child might be trying to retrieve. If one is willing to make this somewhat tenuous assumption, then the incongruous phrases should be less useful than the labels in retrieving the differentiating details, even if the labels and the incongruous phrases were themselves equally retrievable.

Another class of explanations that is rendered questionable is that which suggest that the labels change a general strategy or state that the child is in. For example the facilitation could conceivably result from the verbal components inducing a more active strategy of processing. The attractive thing about such an explanation is that it could suggest why such a variety of verbal stimuli would have apparently equivalent effects. However, the effect is still obtained when the same child is given both visual-only and visual-verbal items in either a within-list or between-list design.

Evidently then, the effect of the verbal component is in the activity that it induces in the child for the processing of a given item. Possibly the activity of reconciling, accepting or rationalizing the relationship between a picture and the accompanying verbal component leads to more effective storage. That is, in the process of checking the relationship between the two components, the child is more active or notices more of the differentiating details. In this way the relationship between the phrase and the picture would not have to be very close to produce the facilitation effect.

These effects in general suggest caution in the interpretation of many labelling experiments. It is tempting to attribute any effect of labelling to the specific properties of the label, such as its length, familiarity, or assumed appropriateness for the referent involved. That certainly was our first temptation in interpreting the first result we obtained. As such, the findings in this report make a contribution to knowledge about the relationship between verbal and non-verbal activity in the child.

Yet in one other regard the result is a bit disappointing. We had originally hoped that the facilitation would be limited to a particular variety of verbal stimulus. This would give us an opportunity to analyze the relationship between the information connoted by the verbal stimulus itself, and that displayed in the picture. There are two things that have gotten in the way of this aspiration. One is the fact that the effect, although extremely reliable is not much larger than a difference of 10%. This clearly limits the types of analytic conditions that are feasible, as was mentioned in commenting on experiments 1-4. More importantly, there is no reason from the present results to believe that the facilitation effect can be closely related to any specific properties of the verbal component as long as it is meaningful. This is an interesting finding in itself, but not one which encourages further specific analysis.

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List of Appendices

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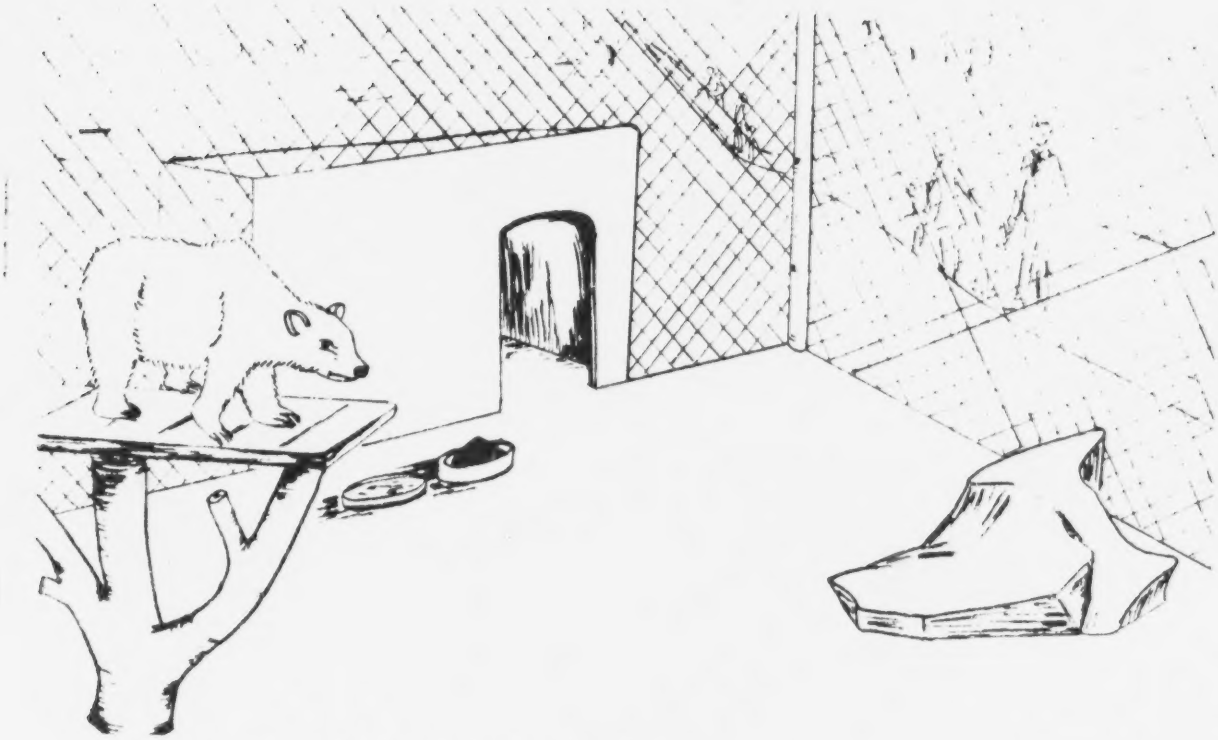

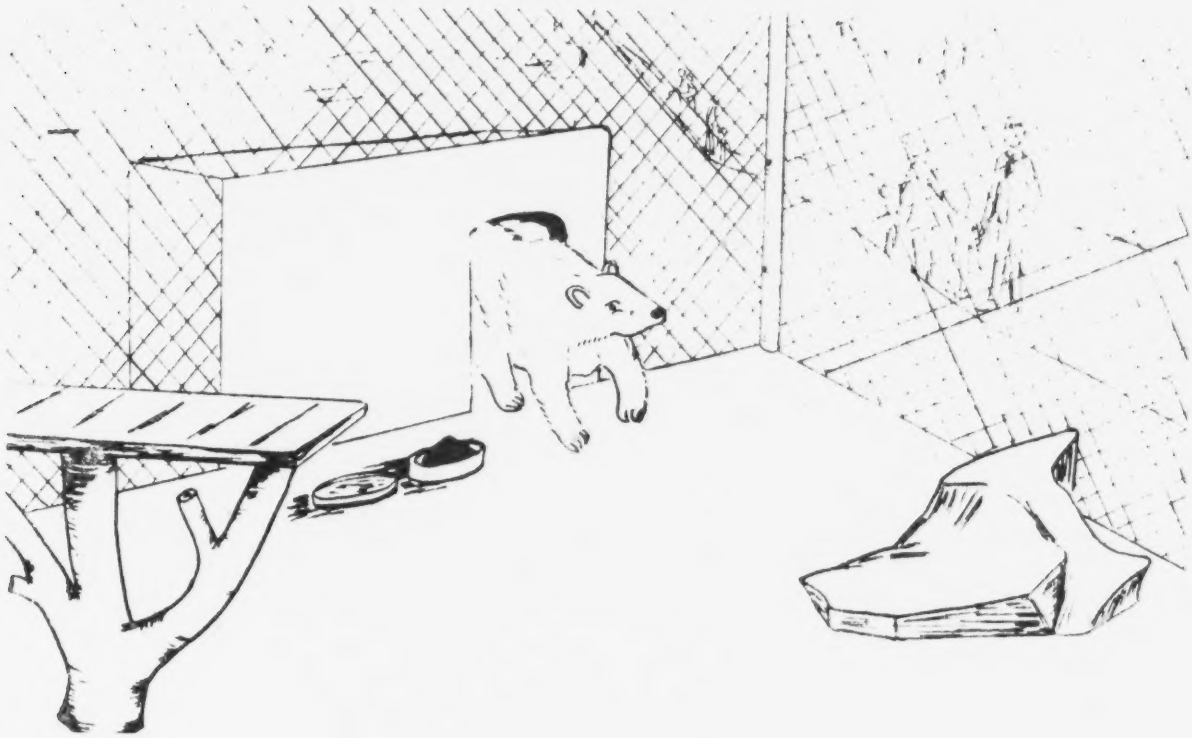

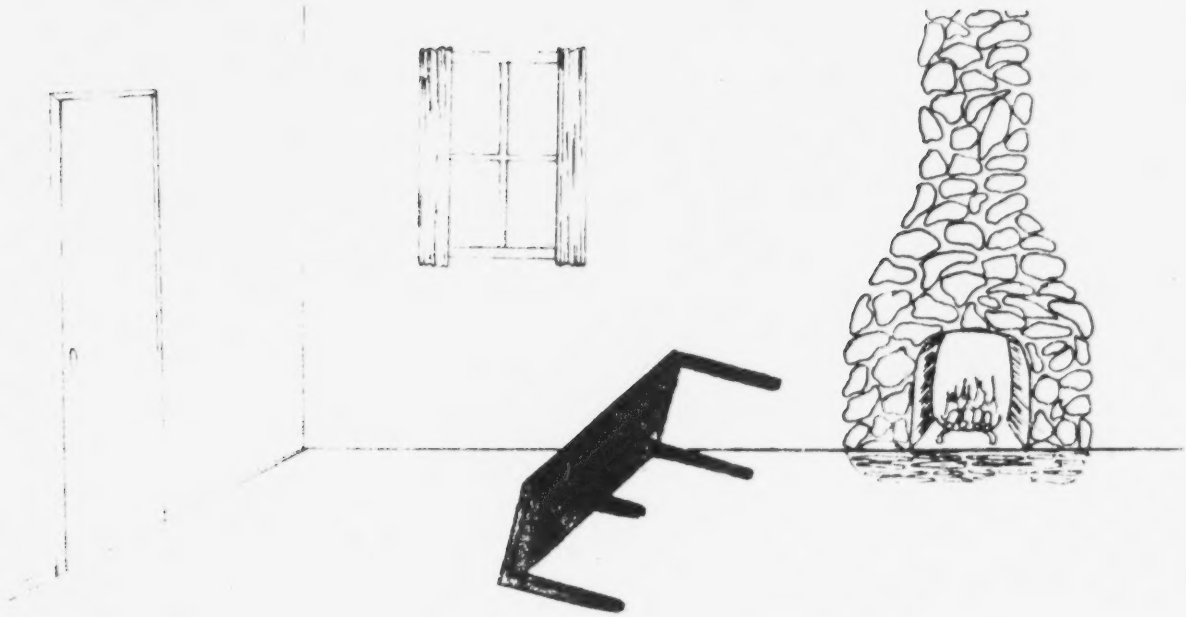

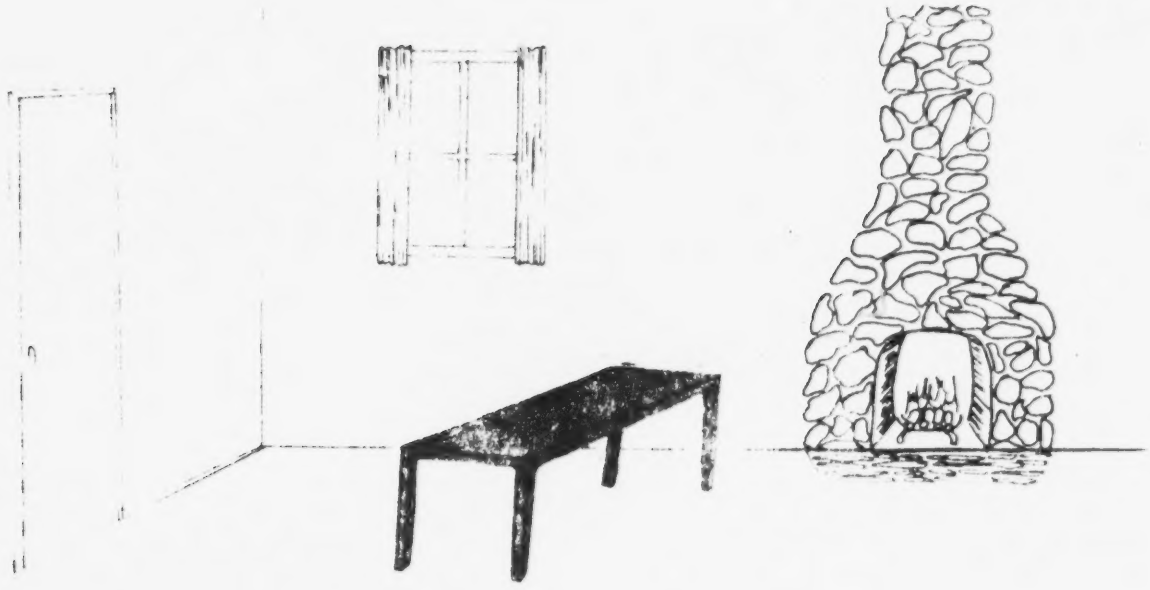

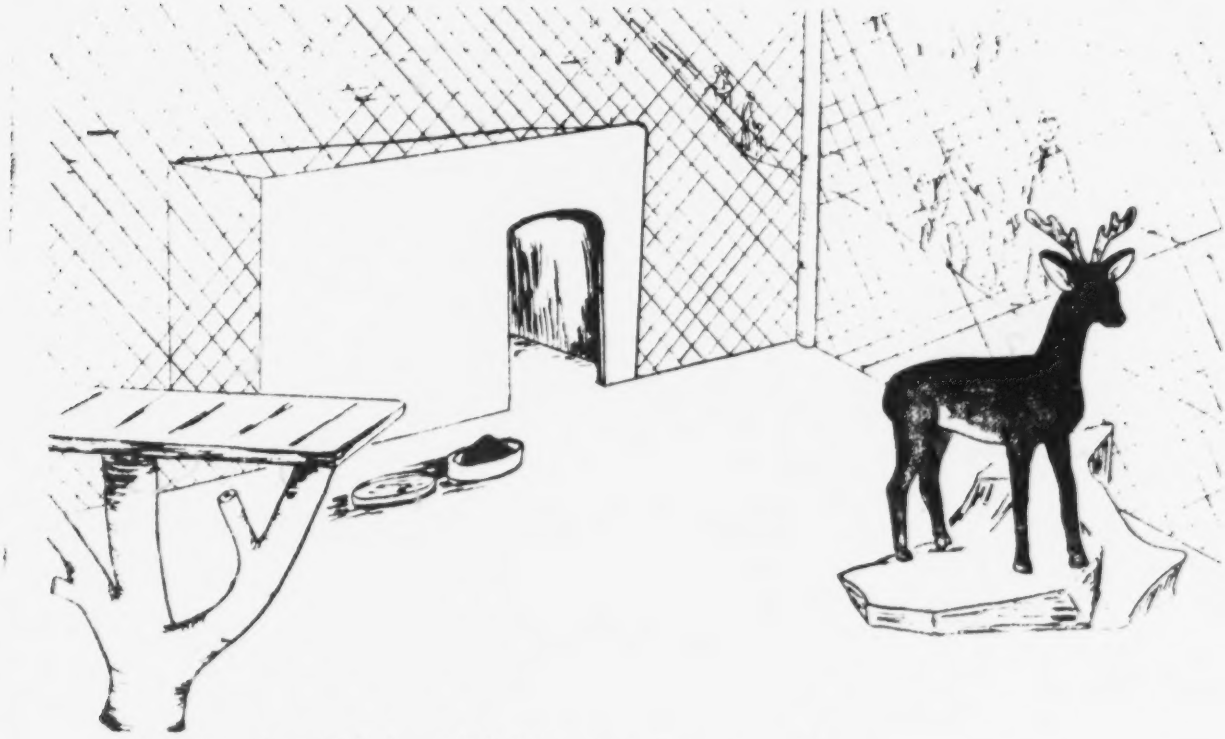

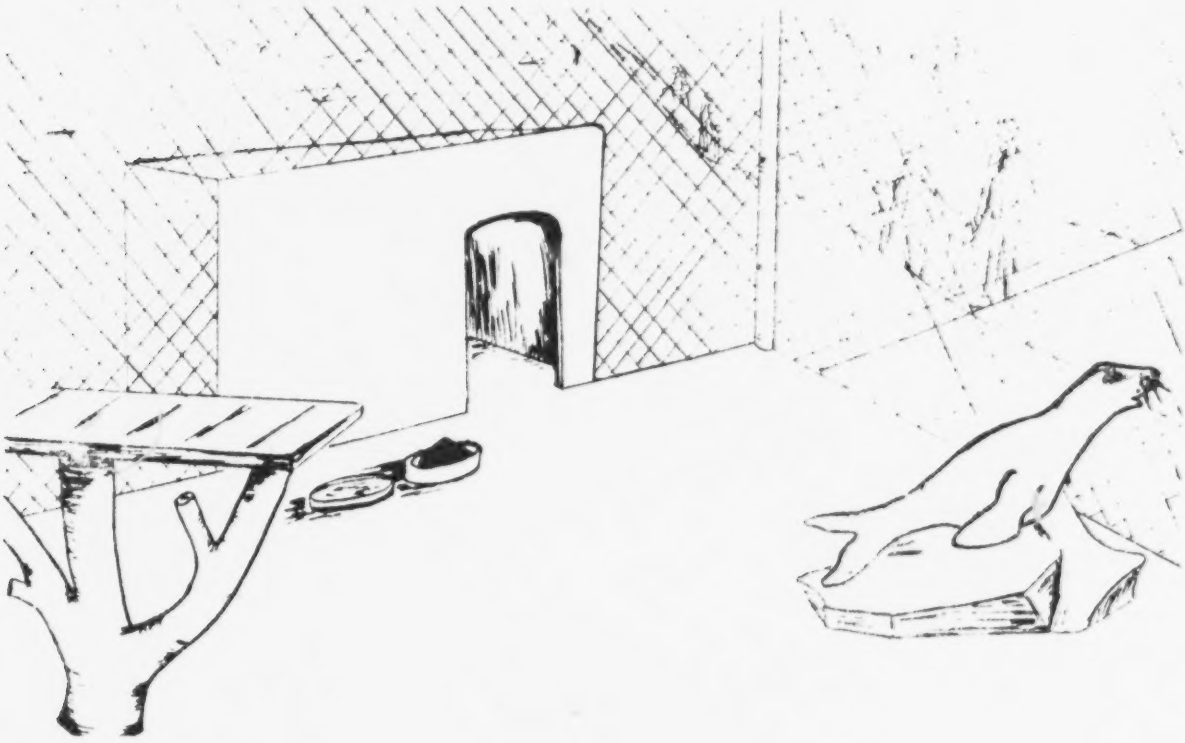

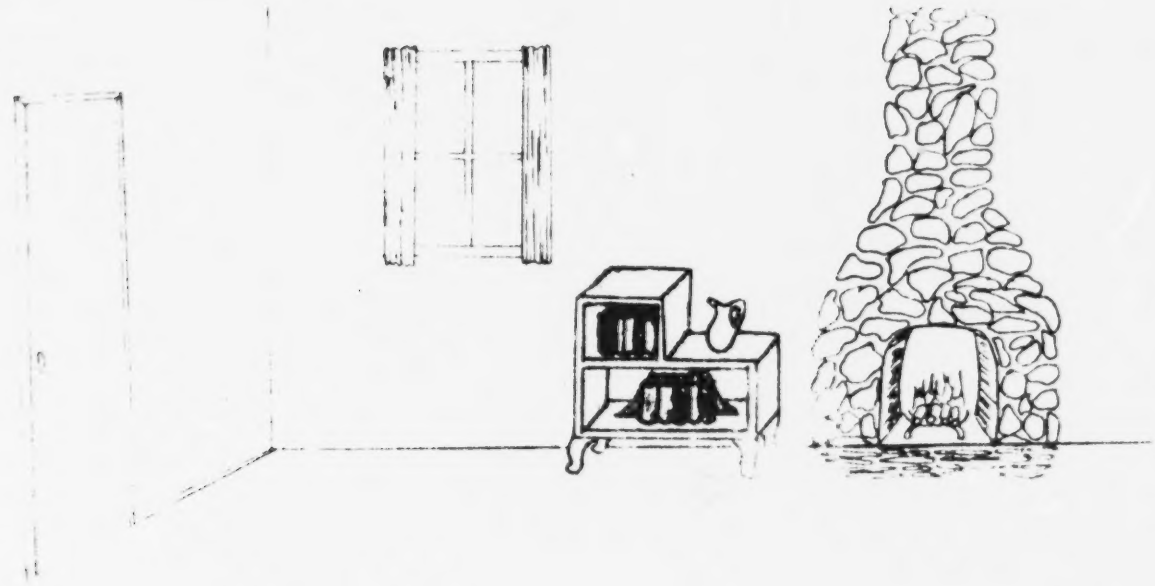

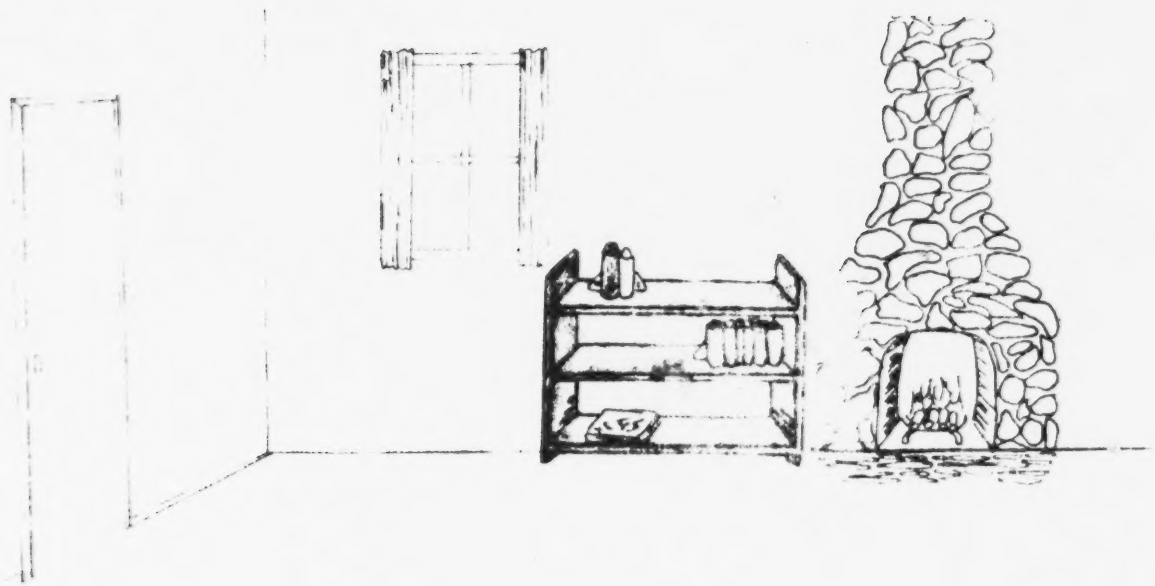

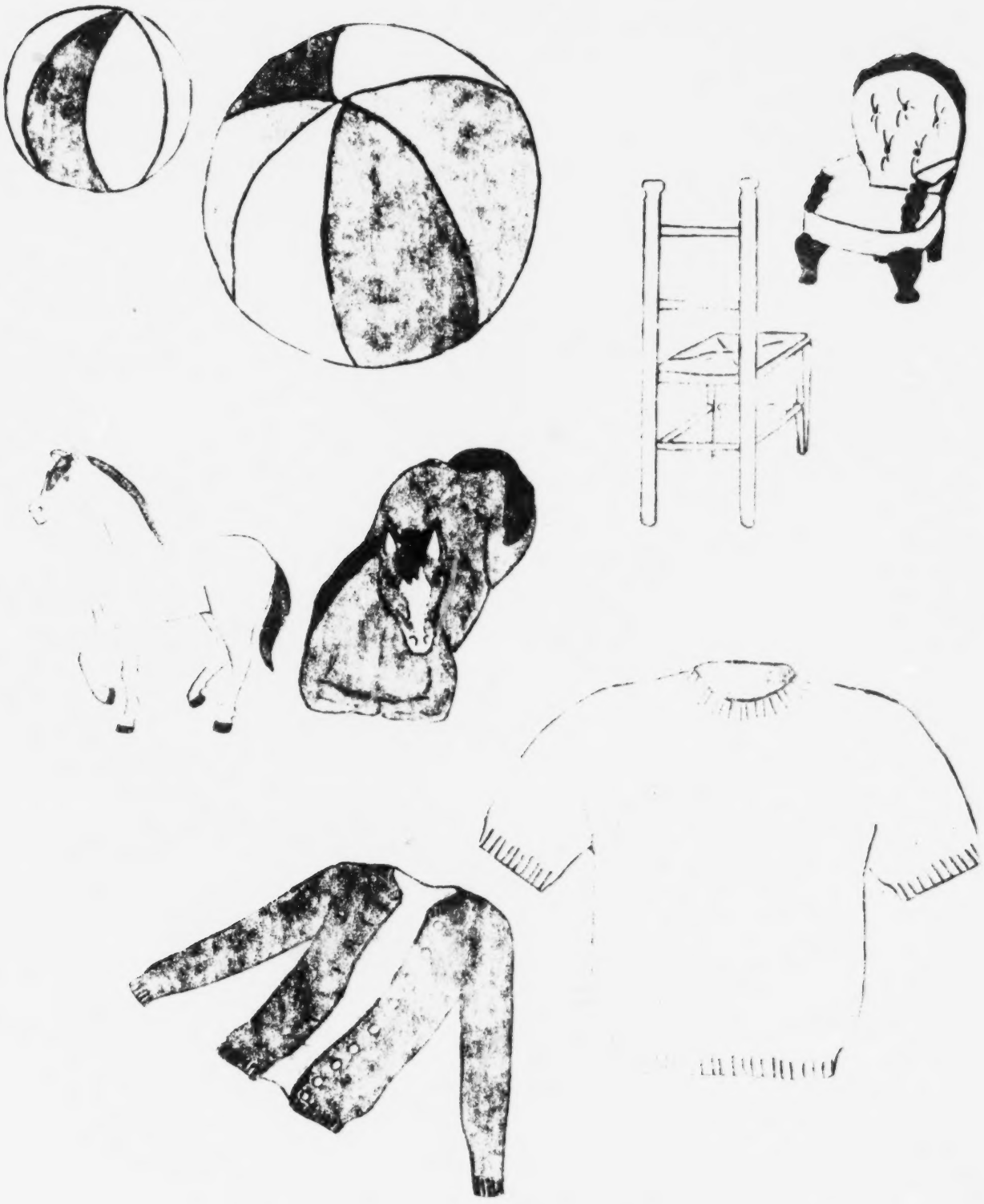

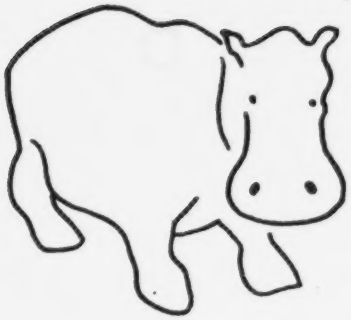

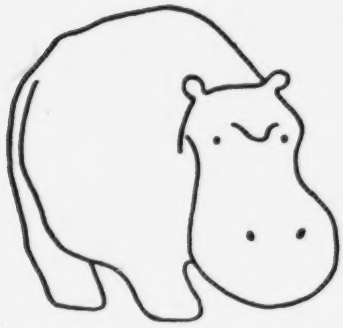

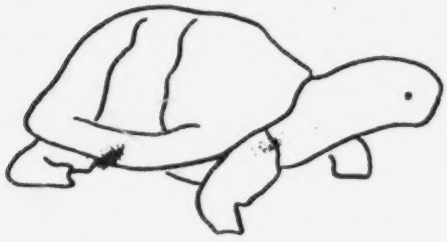

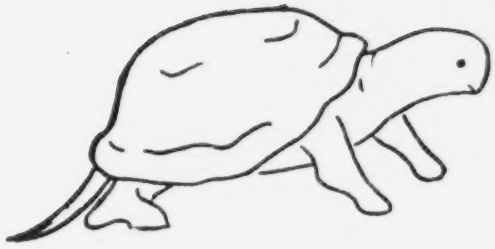

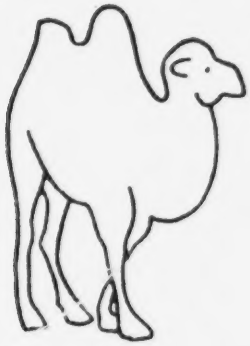

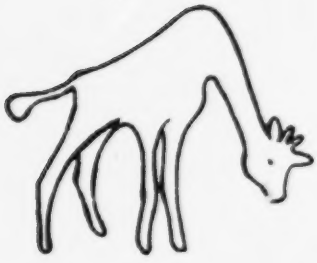

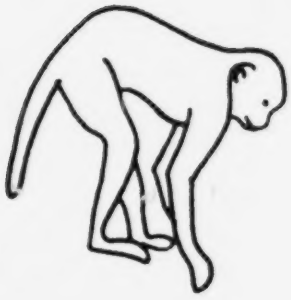

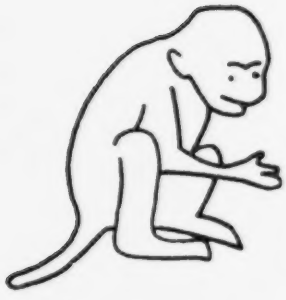

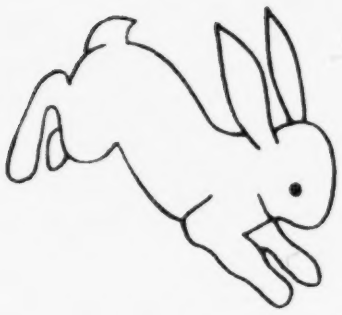

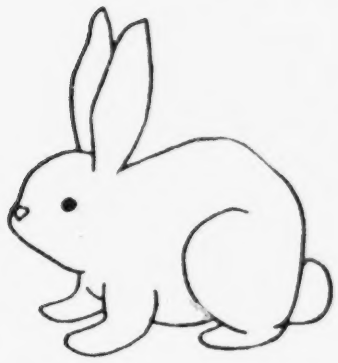

Verbal descriptions associated with pictures in set 1.

Card #	Label	Non-connotative phrase	Incongruous phrase
1	owl	is looking at you	yawning
2	rabbit	ears sticking up	has small ears
3	parrot	tail is straight	has big feet
4	duck	has its mouth open	sitting down
5	giraffe	hears a noise	has a short neck
6	monkey	has lost something	running
7	hippo	going home	has a hat on
8	turtle	looking at this side (right)	tying its shoes
9	camel	has a tummyache	rubbing its nose
10	groundhog	makes a noise	has a long tail
11	bear	heavy	standing up
12	ice cream	full	has a sore hand
13	airplane	going down	staying still
14	key	pointing down	flying
15	submarine	has no hair/fur	driving a car
16	stoplight	fun to look at	lying down
17	hammer	you can pick it up	soft
18	gun	pointing to the corner of the picture	jumped up
19	iron	we have one	you put it in the refrigerator
20	knife	not very big	hanging from the ceiling
21	lock	cold	smoking a cigarette
22	teapot	Mommy has one	has spaghetti in it
23	chair	a nice colour	horses stand on it
24	umbrella	all ready to use	closed up
25	rollerskate	shiny	drawing a picture
26	shoe	all wet	you put it on your neck
27	mitt	we wear this	eating dinner
28	mountain lion	has its foot up	riding in a wagon
29	pig	can't see you	asleep
30	dog	hungry	saying "meow"
31	pail	has paint on it	looking at you
32	hat	got dirty	laughing

Verbal descriptions associated with pictures in set 2.

Card #	Label	Non-connotative phrase	Incongruous phrase
1	penguin	looking at that side (left)	standing on its head
2	pelican	nose pointing down	riding a bicycle
3	woodpecker	happy	taking a bath
4	rat	going to the store	you write with this
5	squirrel	tail is sticking up	hopping on one foot
6	chicken (rooster)	tired	drinking some water
7	horse	saying "hello"	combing its hair
8	hat	soft to touch	scratching itself
9	elephant	smelling something	has a little nose
10	fish	going up	talking on the telephone
11	seal	nose is sticking up	climbing a tree
12	frog	sitting down	rolling over
13	apple	not very heavy	it is empty
14	sailboat	very pretty	cows play with it
15	windmill	big	it has its mouth open
16	rocket	pointing up	going down
17	helicopter	staying still	Mother cooks supper on it
18	bell	not it is quiet	watching TV
19	candle	an old one	stuck in the mud
20	football	somebody dropped it	has a funny face
21	rattle	you hold it by the handle	has clothes on
22	paintbrush	not being used	very heavy
23	chest	empty	wide open
24	jug	was washed	has fur
25	kettle	not very high	walking home
26	cup	warm	saying "goodbye"
27	scissors	sometimes squeaks	crying
28	sock	Daddy has one	hungry
29	lamb	looking all around	swimming
30	kitten	has a sore foot	playing the piano
31	lamp	silly one	grows on trees
32	boot	standing up straight	fallen down